MOTOR STARTER PROTECTION

EFX

EARTH LEAKAGE LOCKOUT & FROZEN CONTACTOR PROTECTION RELAY

SMART, INTEGRATED PROTECTION FOR MINING MOTOR STARTERS

The EFX is a next-generation protection relay that integrates Earth Leakage Lockout (ELL) and Frozen Contactor (FC) protection into one compact and reliable device.

It also monitors phase rotation, phase loss and undervoltage to ensure safe and reliable operation of the starter.

Designed to meet the demands of harsh industrial environments, the EFX complies with AS2081:2011 and provides comprehensive protection with simple installation and commissioning.



FIG. 1 — EFX RELAY, FRONT VIEW

EARTH LEAKAGE TRIP **5 – 500 mA**	TRIP TIME **75 ms – 30 s**
OUTPUT CONTACTS **3 × C/O, 5 A**	SUPPLY RANGE **110 – 240 V AC**

AS2081:2011 COMPLIANT

EX IB IIC CERTIFIED

AUSTRALIAN DESIGNED & SUPPORTED

KEY FEATURES

01 Earth Leakage Lockout (ELL) protection
02 Frozen Contactor (FC) detection
03 Phase rotation monitoring
04 Phase loss detection
05 Undervoltage monitoring
06 Adjustable trip levels and time delays
07 Lockout and restart from front panel control
08 Test facility for straightforward commissioning
09 LED status indication for every protection function

KEY BENEFITS

COMPREHENSIVE PROTECTION
ELL, FC, phase rotation, phase loss and undervoltage in a single device.

PRECISE CONTROL
Tunable trip levels and time delays to suit the installation.

SIMPLE & SECURE
Front panel controls, test facility and lockout restart.

RELIABLE & TOUGH
Designed for harsh mining and industrial environments.

PROTECTION FUNCTIONS

EARTH LEAKAGE LOCKOUT (ELL)
Continuously monitors earth leakage current and trips when leakage exceeds the set level for longer than the set delay.

FROZEN CONTACTOR (FC)
Detects a welded or closed starter contactor by monitoring for unexpected earth leakage while the starter is off.

PHASE ROTATION (PH)
Ensures correct phase sequence and trips on incorrect rotation.

PHASE LOSS (PL)
Detects the loss of any phase.

UNDERVOLTAGE (UV)
Trips when the supply voltage falls below the set threshold.

LOCKOUT & RESET
Trips latch in a lockout condition; manual or remote reset is required to clear.

APPLICATIONS

MMS	EC	P&F	S/P	S&R	C/F
Mining motor starters	Electrical cabinets	Pumps & fans	Surface & process equipment	Stacker & reclaimer	Conveyor & feeder systems

TERMINAL LAYOUT & FRONT PANEL

1	2	3	4	5	6	7	8	9	10	11	12	13	14
L	N	EL	EL	FC	FC	PH	PH	PH	PL	PL	PL	UV	UV

SUPPLY & LEAKAGE

- Power
- Trip
- EL Healthy
- EL Operate

CONTACTOR & SUPPLY QUALITY

- FC Healthy
- FC Operate
- Lockout / Reset
- Phase OK
- Phase Loss
- UV

TEST & RESET

TEST ▭ RESET

Test facility and lockout reset on the front panel; remote reset via terminal 23.

NO	C	NC	NO	C	NC	TEST	COM	RS
15	16	17	18	19	20	21	22	23
Trip	Trip	Trip	Lockout	Lockout	Lockout	Test input	Common	Remote reset

FIG. 2 — EFX TERMINAL DESIGNATIONS AND FRONT-PANEL INDICATION

INDICATION

Power	Supply present
Trip	Protection active
EL Healthy	Earth leakage circuit healthy
EL Operate	Earth leakage trip
FC Healthy	Contactor circuit healthy
FC Operate	Frozen contactor trip
Phase OK	Correct phase rotation
Phase Loss	Phase loss detected
UV	Undervoltage detected
Lockout / Reset	Relay locked out

CONTROL SETTINGS

EL TRIP LEVEL

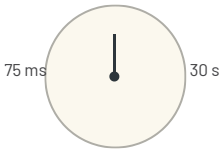
5 – 500 mA selectable



Milliamps, front panel rotary switch

EL TRIP TIME

75 ms – 30 s selectable



Front panel rotary switch

Trip settings	EL trip level and time set on the front panel rotary switches
Lockout	Trips latch; reset at the panel or remotely via terminal 23
Test facility	Front panel test input (terminal 21) for commissioning

INSTALLATION NOTES

01 Earth leakage sensing requires an approved core-balance CT on terminals 3 – 4.

02 Cable screens to be earthed at one end only.

03 All connections must comply with the requirements of AS2081.

04 All contacts shown in the de-energised (relay healthy) condition.

TERMINAL FUNCTIONS

NO.	TERMINAL	FUNCTION
1	**L**	Supply live, 110 – 240 V AC
2	**N**	Supply neutral
3 – 4	**EL**	Earth leakage input (CT)
5 – 6	**FC**	Frozen contactor input
7 – 9	**PH**	Phase rotation input, phases A / B / C
10 – 12	**PL**	Phase loss input, phases A / B / C
13 – 14	**UV**	Undervoltage input
15 – 17	**Trip**	NO / C / NC changeover output
18 – 20	**Lockout**	NO / C / NC changeover output
21	**TEST**	Test input
22	**COM**	Common
23	**RS**	Remote reset input

DIMENSIONS & ENCLOSURE

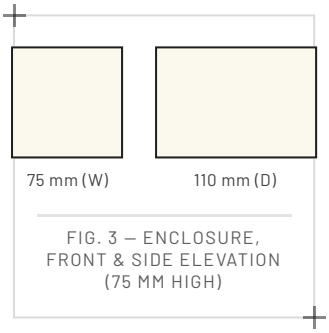


FIG. 3 — ENCLOSURE, FRONT & SIDE ELEVATION (75 MM HIGH)

Dimensions	75 mm (W) × 75 mm (H) × 110 mm (D)
Material	High-impact flame retardant polycarbonate
Protection	IP20
Mounting	DIN rail (35 mm)
Terminals	Cage screw terminals
Weight	331 g (approx.)

SPECIFICATIONS

SUPPLY

MODEL	MIN	TYP	MAX	UNIT
EFX-110	110	240	240	V AC, 50/60 Hz

Power consumption	5 VA (max)
Operating temperature	0 – 60 °C
Earth leakage trip level	5 – 500 mA, adjustable
Earth leakage trip time	75 ms – 30 s, adjustable
Undervoltage trip level	Less than 85 V AC (typical)
Relay contacts	3 × changeover (SPDT)
Contact rating	5 A at 240 V AC (resistive)
Protection functions	ELL, FC, phase rotation, phase loss, undervoltage

ORDERING INFORMATION

PART NO.	DESCRIPTION
EFX-110	EFX relay — 110 – 240 V AC

Supplied with: Relay unit, instruction sheet and wiring diagram.

STANDARDS & COMPLIANCE

AS2081:2011 — Electrical equipment for mines and quarries

IECEx & ATEX — Ex ib IIC certified when used with approved barriers

RoHS — Compliant

EX IECEX RCM E200379

FLYSHTEC

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